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IS 9151 (1979): Glossary of terms for process equipment
[MED 17: Chemical Engineering Plants and Related Equipment]

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Bhartṛhari—Nītiśatakam

“Knowledge is such a treasure which cannot be stolen”



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Indian Standard

GLOSSARY OF TERMS FOR PROCESS EQUIPMENT

1. Scope — Covers the terminology relating to various types of process equipment used in chemical and allied industries.

2. Terminology

2.1 Agitator — An equipment used for operations like mixing, blending, dissolution, precipitation, extraction and dispersion. The assembly consists of impeller, impeller shaft and drive including other parts such as gland and bearing used in conjunction with the above.

2.2 Autoclave — Generally, vertical cylindrical pressure vessel equipped generally with an agitator, heated or cooled either in an external jacket or internal coils or both in order to facilitate chemical reaction.

2.3 Boiler — An open vessel in which a process is carried out. It may be of vertical, cylindrical, horizontal, U or basin shape. It may be fitted with a loose lid to exclude dust.

2.4 Centrifuges

2.4.1 Centrifuge — A machine intended for separation of solids from liquids and so designed to subject the material being processed to centrifugal force such that liquid phase is forced through a permeable membrane such as screen for separation from the solid phase.

2.4.2 Batch centrifuge — A centrifuge in which solid phase or the residue is removed after each centrifugal operation.

2.4.3 Continuous centrifuge — A centrifuge in which solid phase or the residue is removed continuously.

2.5 Centrifugal Separator — A machine which subjects a mass or a stream of mixed liquids to centrifugal force, thereby separating them.

2.6 Chimney or Stacks — A tall vertical cylinder with its top open to atmosphere to vent waste gases or other fluids into the atmosphere.

2.7 Column (Tower) — A vertical, cylindrical vessel intended for carrying out either adding, stripping, distillation, extraction, absorption or adsorption.

This may be a tall vessel fitted internally with plates or packed with various types of packings to facilitate intimate contact of vapour and liquid phases.

2.8 Condenser — A cooling equipment the primary purpose of which is the removal of latent heat of incoming vapours. It may be either shell and tube or direct contact type.

2.9 Cooler — An equipment primarily employed to cool process fluids, water or air being primarily the cooling medium. It may be either a shell and tube, cascade or finned tube type.

2.10 Cooling Tower — A tower used to cool water by means of contact with air, the tower may have a natural or forced or induced draught.

2.11 Crystallizer — A vessel primarily intended for carrying out crystallization of solids in supersaturated solutions. It may be a pan of vertical, cylindrical, U or basin shell fitted with a coil for either heating, cooling or both. Usually, it is fitted with a stirring mechanism.

2.12 Deaerators — A vessel wherein dissolved air is removed by heating with steam.

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2.13 Demisters — A device or vessel wherein entrained mist in gases is removed by suitable packing or layers of wire mesh.

2.14 Desuperheater — A vessel in which superheated fluid is brought in contact with respective liquid spray to make it saturated or less highly superheated. Usually, it implies steam-water system.

2.15 Drier — A vessel provided with heating arrangement in which solutions or suspensions are reduced to dry powders or wet material reduced to the dry condition. It may be a pan of vertical, cylindrical, U or basin shape. If closed, to enable the vapour to be collected and led away, it may be vertical cylindrical, horizontal cylindrical or U shape. Most driers are fitted with stirring equipment and in many cases they operate under vacuum.

Note — A cylindrical drier used for air-drying using blower and heating coil may also be classified under this category.

2.16 Evaporator — A vessel provided with heating arrangement for concentrating liquids containing solids in solution or suspension. It may be a pan of vertical, cylindrical or basin shape.

If, closed to enable the vapour to be collected and led away, it may be of vertical cylindrical, horizontal cylindrical or basin shape. These types are sometimes fitted with stirring mechanism and the closed pattern frequently operates under vacuum.

2.17 Filter — An equipment used to separate fluids and suspended solids either for recovery of solids, classification of fluid or both simultaneously. The fluid flows through the pores in a cloth, wire mesh or granular bed and thus the solid is sieved out.

2.18 Fired Heater — A directly fired tubular equipment used in various heating, treating and vapourizing services by directly firing either liquid or gaseous fuels. These are also called furnaces in petroleum and petro-chemical industry.

It may be vertical, cylindrical, box or cubicle type having heating coils, burners and stack. It is normally lined inside with refractory.

2.19 Granulator — A rotating cylinder or pan wherein powder is converted into granules by a liquid spray.

2.20 Heat Exchanger — An equipment which transfers heat between two process streams through an intervening surface.

It may be either shell and tube, double pipe, coil, plate or finned tube type.

2.21 Heater — An equipment which is primarily used to heat process fluid. Steam is usually employed for this purpose, also, any other heat transfer fluid may serve the purpose like hot recirculated oil in oil refineries.

It may be either shell and tube, double pipe or coil type.

2.22 Incinerator — An equipment employed for burning of the refuse and converting the same into ash under controlled conditions of smokeless and odourless combustion. Normally, the equipment is used at site.

2.23 Mixer — A vessel provided with the equipment for stirring and mixing the charge. It may be of cylindrical, square, rectangular, conical, U, basin or Y shape, open as a pan or closed to exclude dust or to confine fumes. It may be in-line mixer without stirrer in U or cylindrical shape.

2.24 Pan — An open vessel in which a process is carried out. It may be of vertical, cylindrical, horizontal, U or basin shape. It may be fitted with a loose lid to exclude dust.

2.25 Reboiler — An exchanger employed to supply heat requirements at the bottom of distillation columns.

2.26 Separator — A vessel either of vertical cylindrical shape, with a flat or conical bottom or of horizontal shape used for separation of immiscible liquids of different specific gravities. It is sometimes provided with heating equipment and is frequently closed to exclude dust or confine fumes.

Note — Oil separators in use at refineries to skim oil from mixture of oil and water settling the mixture in open pond is included in this category.

2.27 Still — A closed vessel from which volatile components are vaporized, collected and recovered. It may be of vertical cylindrical, horizontal cylindrical or basin shape and may be provided with heating equipment. Many stills operate under vacuum and in some cases stirring equipment is provided.

2.28 Thickener — An equipment in which gravitational settling of solid particles that are suspended in a liquid is carried out. This may be a vertical cylindrical vessel with a conical or flat bottom. Continuous thickener is normally fitted with a slowly revolving plough plates for removing the settled sludge.

2.29 Vapourizer — When not used for the formation of steam and does not form part of distillation process a vapourizing exchanger is simply called vapourizer.

It is shell and tube type apparatus.

2.30 Waste Heat Boiler — A boiler in which the sensible heat of a process stream or a waste gas is recovered thereby generating steam.

EXPLANATORY NOTE

Chemical and allied industries cover a wide range of operations and processes and consequently use varied categories of process vessels such as pans, evaporators and heat exchangers, stills and columns, reaction vessels and autoclaves, separators, mixers and crystallizers, and driers to suit individual requirements. In order to overcome the confusion which exists in industry regarding above names applied to various process vessels, an attempt has been made to give unambiguous definitions in this standard.

In the preparation of this standard, assistance has been derived from BS : 3161-1960 Sizes of process vessels for chemical and allied industries issued by the British Standards Institution.

The terminology of crushing and grinding equipment and that for conveying equipment are covered in IS : 3612-1966 'Classification and methods for measuring capacity of crushing and grinding equipment' and IS : 4240-1967 'Glossary of conveyor terms and definitions' respectively. For the capacity and sizes, IS : 4179-1967 'Sizes of process vessels and leading dimensions' and IS : 2843-1964 'Recommendation on nominal capacities for process equipment' and IS : 2844-1964 'Recommendation on nominal diameters for process equipment' may be referred.